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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/579,468	05/15/2006	Hiroyuki Eguchi	062518	6953
38834 7590 09/03/2008 WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP 1250 CONNECTICUT AVENUE, NW SUITE 700 WASHINGTON, DC 20036				
EXAMINER				
BEHM, HARRY RAYMOND				
ART UNIT		PAPER NUMBER		
2838				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/579,468

Applicant(s)

EGUCHI ET AL.

Examiner

HARRY BEHM

Art Unit

2838

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 July 2008.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-3 and 5 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 15 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/5508)
4) ☐ Interview Summary (PTO-413)
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____
Paper No(s)/Mail Date _____

DETAILED ACTION

Terminal Disclaimer

The terminal disclaimer filed on 7/14/08 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of 10/581,916 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Arguments

Applicant's arguments with respect to the amended claims have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain (US 6,519,168) in view of Jang (US 6,301,128).

With respect to Claim 1, Jain discloses a DC-AC converter comprising:

a transformer (Fig. 15 214) having primary side terminals, secondary side terminals, a primary side winding (Fig. 15 N1), and a secondary side winding (Fig. 15 N2), and determining a voltage conversion ratio;

switching means (Fig. 15 104) interposed between said primary side terminals and said primary side winding;

an LC resonant circuit (Fig. 15 Ls,Cs) having a resonating reactor (Fig. 15 Ls) connected in series with said secondary side winding of said transformer, and a resonating capacitor (Fig. 15 Cs) that resonates with said resonating reactor; and

a driving means (Fig. 5 502,114) for turning said switching means ON/OFF, wherein: resonant frequency detecting means (Fig. 5 112) for detecting a frequency of a resonant current [both resonant current and resonant voltage at the operating frequency as shown in Fig. 13B] caused by an operation of said LC resonant circuit and means for feeding the frequency detected by said resonant frequency detecting means back to said driving means (Fig. 5 502,114) are provided; and

said driving means turns said switching means ON/OFF at a resonant frequency of said LC resonant circuit based on the frequency detected by said resonant frequency detecting means (Fig. 13B V_p , i_s , $V_{gA_{R1}}$).

Jain does not disclose an output rectifier, but Jang discloses an output rectifier (Fig. 10 Controlled Full-Bridge Rectifier) for a bi-directional converter. It would have been obvious to one of ordinary skill in the art at the time of the invention to implement a bi-directional DC-DC converter by implementing a full bridge rectifier in the secondary. The reason for doing so is to generate a DC output voltage "With the ability of the system to transfer power through the transformer in both directions, i.e., from the input to the output, and vice versa, the energy stored in the leakage inductances can be either transferred to the output, or the input, depending on the load requirement." (Jang column 3, lines 19-24).

With respect to Claim 2, Jain in view of Jang disclose the DC-DC converter according to claim 1, wherein said resonant frequency detecting means (Fig. 5 112) is provided on the primary side of said transformer.

Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain (US 6,519,168) in view of Jang (US 6,301,128) and Hulsey (US 5,568,036).

With respect to Claim 3, Jain discloses a DC-AC converter comprising such known features as a transformer (Fig. 15 214), an LC resonant circuit (Fig. 15 Ls,Cs) on the secondary side, and driving means (Fig. 5 502) for driving a primary side full bridge inverter (Fig. 5 104), and a driving means (Fig. 5 502,114) for turning said switching means ON/OFF, wherein: resonant frequency detecting means (Fig. 5 112) for detecting a frequency of a resonant current [both resonant current and resonant voltage at the operating frequency as shown in Fig. 13B] caused by an operation of said LC resonant circuit and means for feeding the frequency detected by said resonant frequency detecting means back to said driving means (Fig. 5 502,114) are provided; and said driving means turns said switching means ON/OFF at a resonant frequency of said LC resonant circuit based on the frequency detected by said resonant frequency detecting means (Fig. 13B V_p , i_s , $V_{gA_{R1}}$).

Jain does not disclose boosting the output voltage, but Hulsey discloses a DC-DC converter stepping up the output of a bridge inverter (Fig. 1 21) with the turns ratio of transformer 30 and having low-voltage side terminals on the primary side, high-voltage side terminals on the secondary side, a low-voltage side winding on the primary,

and a high-voltage side winding on the secondary. It would have been obvious to one of ordinary skill in the art at the time of the invention to implement a step up turns ratio from the primary to the secondary and a low-voltage side pair of switching means interposed on the primary side between said low-voltage side terminals and said low-voltage side winding and a low-voltage side rectifying element [anti-parallel diode] connected in parallel with each of switching elements in said low-voltage side pair of switching means. The reason for doing so is to allow "for the use of a stepped-up voltage level" (Hulsey column 1, lines 55-57).

Jain also does not disclose an output rectifier, but Jang discloses an output rectifier (Fig. 10 Controlled Full-Bridge Rectifier) for a bi-directional converter. It would have been obvious to one of ordinary skill in the art at the time of the invention to implement a bi-directional DC-DC converter by implementing a full bridge rectifier (Fig. 10 Full Bridge Rectifier) having

- a high-voltage side pair of switching means (Fig. 10 S1-S4) interposed between said high-voltage side terminals and said high-voltage side winding;

- a high-voltage side rectifying element [anti-parallel diode] connected in parallel with each of switching elements in said high-voltage side pair of switching means;

- a driving means (Fig. 8 Driver, PWM Modulator) for turning ON/OFF the switching elements in said low-voltage side pair of switching means and the switching elements in said high-voltage side pair of switching means. The reason for doing so is to generate a DC output voltage "With the ability of the system to transfer power through the transformer in both directions, i.e., from the input to the output, and vice versa, the

energy stored in the leakage inductances can be either transferred to the output, or the input, depending on the load requirement.” (Jang column 3, lines 19-24).

With respect to Claim 5, Jain in view of Jang and Hulsey discloses the bi-directional DC-DC converter according to claim 3, wherein said low-voltage side pair of switching means (Jain Fig. 15 104) and said high-voltage pair of switching means (Jang Fig. 10 Controlled Full-Bridge Rectifier) are each configured by interconnecting four switching elements in a bridge.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HARRY BEHM whose telephone number is (571)272-8929. The examiner can normally be reached on 7:00 am - 3:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Akm E. Ullah can be reached on (571) 272-2361. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry Behm/

Examiner, Art Unit 2838

/Jeffrey L. Sterrett/

Primary Examiner, Art Unit 2838